

XXIX.—*Mollusca, Vermes, and Cœlenterata of the Second German North-Polar Voyage.* By CARL MÖBIUS*.

[Plate XI. figs. 4-14.]

THE region in which the invertebrate marine animals cited in the following Catalogue were collected by Dr. Pansch, between the shore line and a depth of 30 fathoms, extends from $73^{\circ} 50'$ to $75^{\circ} 15'$ N. lat. Here the animals live in a temperature which varies but little throughout the year. According to the log-book of the 'Germania,' Captain Koldewey, the daily average of the surface-temperature from the 9th of July to the 13th of September 1869, from $70^{\circ} 44'$ to $75^{\circ} 30'$ N. lat., only oscillated between $1^{\circ} 62$ and $1^{\circ} 29$ R. ($=35^{\circ} 64$ and $34^{\circ} 9$ F.). Then ice was produced, beneath which, from the 3rd of October 1869 to the 21st of May 1870, a temperature of $1^{\circ} 5$ – 2° R. ($=35^{\circ} 4$ – $36^{\circ} 5$ F.) prevailed. Measurements of temperature down to 220 fathoms within the same latitudes between the 13th of July and the 3rd of August 1869 gave $0^{\circ} 4$ – $1^{\circ} 3$ R. ($=32^{\circ} 9$ – $34^{\circ} 92$ F.).

In the year 1870 the surface temperature between $71^{\circ} 20'$ and $75^{\circ} 26'$ N. lat. from the 11th of July to the 28th of September was found to be $0^{\circ} 02$ – $4^{\circ} 62$ R. ($=32^{\circ} 045$ – $42^{\circ} 4$ F.). Between $73^{\circ} 11'$ and $71^{\circ} 30'$ from the 12th of August to the 27th of September, at depths of 20–300 fathoms, $0^{\circ} 7$ – $2^{\circ} 6$ R. ($=33^{\circ} 57$ – $37^{\circ} 85$ F.) were observed.

According to the log-book of the 'Hansa,' Captain Hege-mann, 1° – $0^{\circ} 6$ R. ($=34^{\circ} 25$ – $33^{\circ} 35$ F.) were found at 20–75 fathoms, on the 14th and 15th of July, in N. lat. $74^{\circ} 37'$ and $74^{\circ} 57'$; and 1° R. ($34^{\circ} 25$ F.) at 100 fathoms in N. lat. $73^{\circ} 5'$.

In his address upon the scientific results of the first German North-Polar voyage of 1868, M. von Freeden says (p. 4):—"Beyond the parallel of Jan Mayen (71° N. lat.) as far as 77° we find a great sea-surface which, from the 1st of June to the 1st of September, possesses a temperature oscillating between 0° and 2° R. ($=32^{\circ}$ and $36^{\circ} 5$ F.), and which is more and more filled with melting masses of ice the further west we go."

Thus, with regard to the oscillations of temperature in their medium, the marine animals of Greenland are in just as favourable a position as the animals of the tropical seas.

According to Dana's 'Classification and Geographical Distribution of the Crustacea,' 1853, p. 1483, the mean surface-temperatures of the thirty coldest and the thirty warmest consecutive days are as follows:—near

* Translated and abridged by W. S. Dallas, F.L.S., from the Report of the Voyage, vol. ii. 1873, pp. 246–261.

Venezuela and Surinam . $18^{\circ}\cdot66$ & $21^{\circ}\cdot32$ R. ($=73^{\circ}\cdot98$ & $79^{\circ}\cdot97$ F.),
 Bahia and Pernambuco . $18^{\circ}\cdot66$ & $22^{\circ}\cdot64$ R. ($=73^{\circ}\cdot98$ & $82^{\circ}\cdot94$ F.),
 Singapore $18^{\circ}\cdot66$ & $23^{\circ}\cdot08$ R. ($=73^{\circ}\cdot98$ & $83^{\circ}\cdot93$ F.),
 Fiji Islands $18^{\circ}\cdot66$ & $23^{\circ}\cdot52$ R. ($=73^{\circ}\cdot98$ & $84^{\circ}\cdot92$ F.),
 Tahiti $18^{\circ}\cdot66$ & $22^{\circ}\cdot64$ R. ($=73^{\circ}\cdot98$ & $82^{\circ}\cdot94$ F.),
 Manilla $20^{\circ}\cdot88$ & $23^{\circ}\cdot52$ R. ($=78^{\circ}\cdot98$ & $84^{\circ}\cdot92$ F.).

From the temperature-observations made by Prof. Carl Semper in the sea surrounding the Philippines, which he has been kind enough to place at my disposal for these comparisons, I extract the following :—

On the 26th of June 1861, near Anhuplate, between 10 o'clock in the morning and 10 o'clock in the evening,

the temperature of the air varied between $20^{\circ}\cdot6$ & $22^{\circ}\cdot9$ R. ($=78^{\circ}\cdot35$ & $83^{\circ}\cdot5$ F.),

the temperature of the surface varied between $21^{\circ}\cdot3$ & $21^{\circ}\cdot8$ R. ($=79^{\circ}\cdot9$ & $81^{\circ}\cdot05$ F.).

At the same place on the same day the temperature at

5 fathoms was	$21^{\circ}\cdot5$ R. ($=80^{\circ}\cdot4$ F.)	at 10 A.M.
17 „	$21^{\circ}\cdot4$ R. ($=80^{\circ}\cdot15$ F.)	at 2:30 P.M.
22 „	$21^{\circ}\cdot4$ R. ($=80^{\circ}\cdot15$ F.)	at 3 P.M.
5 „	$21^{\circ}\cdot5$ R. ($=80^{\circ}\cdot4$ F.)	at 5 P.M.

Thus, at the depths here cited, the temperature differs very little from that of the surface, just as in the northern icy sea.

I suppose that the nearly uniform temperature in which the high-northern marine animals live is one of the chief causes of the considerable size by which, according to numerous observations, they are distinguished from individuals of the same species in temperate regions; for, at the bottom of the icy sea, species which from their nature can thrive in a low temperature are but little if at all exposed to those disturbances which the greater oscillations of temperature produce in the vital conditions of the animals of more temperate seas. The organs can consequently perform their functions in a more uniform manner (so far as these are dependent on temperature) than in individuals of the same species which inhabit, for example, the middle and higher regions of the North Sea and the Baltic, where the differences between the lowest and highest temperatures of the water amount to 10° – 15° R. ($=22^{\circ}\cdot5$ – $33^{\circ}\cdot75$ F.), or sometimes even more, as has been ascertained by H. A. Meyer * for various points in the western basin of the Baltic, and by myself for two places in the North Sea off the German coast †.

* 'Untersuchungen über physikalische Verhältnisse des westlichen Theils der Ostsee' (Kiel, 1871), § 27.

† Zeitschrift für wissenschaftliche Zoologie, Band xxi. 1871, pp. 301, 302.

MOLLUSCA.

GASTEROPODA.

1. *Chiton albus*, Linn. Length 15, breadth 8 millims.
Distr. Spitzbergen to the Cattegat and Britain, Massachusetts (*Gould, Binney*). Down to 550 fathoms.
2. *Lepeta cæca*, Müll. Length 11, breadth 8, height 5 millims.
 Walrus Island, 25 fathoms.
Distr. Circumpolar; Sitka, North Japan (*Schrenck*), Spitzbergen to the Cattegat and Britain.
3. *Trochus grænländicus*, Chemn. Length 13, breadth 15 millims.
 Sabine Island, Jackson Island, North Shannon Island, Germania Harbour; 2-30 fathoms.
Distr. Labrador to Massachusetts; White Sea to the Cattegat and Britain.
4. *Trochus helacinus*, Fab. Length 15, breadth 20 millims.
 Sabine Island, Jackson Island, North Shannon Island; Walrus Island; 4-27 fathoms.
Distr. Circumpolar; Massachusetts, Japanese seas, Norway to the Cattegat and Britain.
5. *Pleurotoma pyramidalis*, Ström. Length 12, breadth 6 millims.
 Sabine Island, Jackson Island, Shannon Island; 4-30 fathoms.
Distr. Greenland to Massachusetts, Spitzbergen to Norway (Bergen).
6. *Fusus propinquus*, Alder. Length 72, breadth 33 millims.
 Sabine Island, Clavering Island, Germania Harbour; 2-20 fathoms.
Distr. Russian arctic coast to the Cattegat and Ireland.
7. *Buccinum undatum*, Linn. Length 42, breadth 30 millims.
 Jackson Island, Clavering Island; 4 fathoms.
Distr. Circumpolar; European and North-American coasts of the North Atlantic, Mediterranean, Sea of Ochotsk.
8. *Scalaria grænländica*, Chemn. Length 30 millims.
 North Shannon Island, 30 fathoms.
Distr. Arctic Ocean, Norway to Bergen.
9. *Naticaclausa*, Brod. & Sow. Length 29, breadth 20 millims.
 North Shannon Island, Sabine Island, Jackson Island, Clavering shore; 30 fathoms.
Distr. Circumpolar; Japanese sea, Finmark.
10. *Cylichna cylindracea*, Penn. Length 19, breadth 4.5 millims.

Jackson Island, 4 fathoms.

Distr. Finmark, Canaries, Mediterranean; 3–160 fathoms.

11. *Clione limacina*, Phips. Length 36 millims.

Distr. West Greenland, Massachusetts.

LAMELLIBRANCHIA.

1. *Modiolaria discors*, Linn. Length 26, height 16, breadth 11 millims.

Shannon, Sabine, Clavering, and Jackson islands; 4–30 fathoms.

Distr. Circumpolar; North-east of America, north Japanese sea, Mediterranean, North Sea, Western Baltic.

2. *Cardium grælandicum*, Chemn. Length 70 millims.

Distr. West Greenland, Massachusetts, Behring's Straits.

3. *Astarte borealis*, Chemn. (*A. arctica*, Gould). Length 33–35, height 27, breadth 7–10 millims.

Shannon, Sabine, Clavering, and Jackson islands; 4–10 fathoms.

Distr. Arctic seas, from Behring's Straits to Lapland, Norway, Baltic to Bornholm.

4. *Astarte sulcata*, Da Costa. Length 25, height 18, breadth 10 millims.

Distr. Circumpolar; Sea of Ochotsk, Canaries, North-eastern America, bays of Kiel and Flensburg.

5. *Astarte compressa*, Mont. Length 14, height 12, breadth 7.5 millims.

Jackson Island.

Distr. Arctic seas, North-eastern America, Spitzbergen, Norway, Britain, Kiel Bay.

6. *Astarte crebricostata*, Forbes. Length 28, height 22, breadth 13 millims.

Shannon Island, 30 fathoms.

Distr. West Greenland, Norway, North-eastern America.

7. *Venus astartoides*, Beck. Length 16, height 12, breadth 7 millims.

Shannon Island, Jackson Island; 4–30 fathoms.

Distr. West Greenland, Massachusetts, seas of Ochotsk and Japan.

8. *Mya truncata*, Linn.

Sabine Island, 10–20 fathoms.

Distr. Circumpolar; Sea of Ochotsk, North-eastern America, Britain, Bay of Biscay, Norway, Western Baltic.

9. *Saxicava rugosa*, Linn. Length 43, height 22 millims.

Shannon Island, 30 fathoms.

Distr. Circumpolar; Japanese and Chinese seas, North-

eastern America, Sitka, Mediterranean, Canaries, North Sea, Western Baltic.

BRACHIOPODA.

1. *Terebratula psittacea*, Gmel. Length 21, breadth 22, height 15 millims.
Jackson Island.
Distr. West Greenland, Massachusetts, Spitzbergen, Finmark.
2. *Terebratula cranium*, Müll. Length 16, breadth 11, height 11 millims.
Shannon Island, 30 fathoms.
Distr. Norway, Shetland Isles, Finmark to the Cattegat.

VERMES.

ANNELIDES.

1. *Polynoë cirrosa*, Pall. Length 47, breadth 10 millims.
Sabine Island.
Distr. Finmark to the Cattegat, Britain, West Greenland, Spitzbergen; 3-120 fathoms.
2. *Polynoë cirrata*, Pall. Length 33, breadth 10 millims.
Sabine Island, Clavering Straits; 4-12 fathoms.
Distr. Circumpolar; Baltic to Sitka.
3. *Nereis diversicolor*, Müll.
Shannon Island.
Distr. Norway, North Sea, Baltic.
4. *Nereis pelagica*, Linn. Length 75, breadth in front 65 millims.
Distr. Western Baltic to Finmark, Spitzbergen, Iceland, West Greenland.

5. LEIPOCERAS, g. n.

Head without tentacles and tentacular cirri; fifth body-segment longer than the preceding and following segments, bearing on each side a comb-like series of thick setæ (Pl. XI. fig. 11); branchiæ linguliform, on both sides of the back of the segments.

Leipoceras uviferum, sp. n. Pl. XI. figs. 4-14.

A spirally rolled worm, 38 millims. long, 1.5 millim. broad in front and 1.2 millim. behind. Seventy segments, the posterior extremity injured. Fore body concave above, arched beneath; from the eleventh segment onwards the concavity disappears and the back also is arched, so that the body then

becomes nearly cylindrical. Head somewhat narrowed in front (Pl. XI. fig. 4). In front, on the cephalic lobes, there are two small round projections. Two eyes, on two flat cushions, which become fused together behind and run out into a single flat and narrow cushion, extending as far as the fourth body-segment.

Buccal orifice bounded to the right and left by pad-like lips, which unite below at an acute angle (fig. 5).

The first body-segment bears two tufts of setæ, which are smaller than those on the three following segments. The setæ of the upper tufts of the fore body (in front of the fifth segment) are subulate, those of the lower tufts narrowly lanceolate (figs. 9 & 10). On the fifth segment there is, both above and below the thick setæ, a small tuft of fine setæ (figs. 11 & 12).

From the sixth segment onwards there are on the ventral surface uncini, five or six in each row; they are slightly sigmoid and two-pointed (fig. 8). The setæ of the dorsal surface stand upon the anterior surface of small tubercles; and behind these are the branchiæ, which only become long enough to be called linguliform from the tenth segment onwards. They are longest on the seventeenth segment. In front of the longer branchiæ the setigerous tubercles are smaller than before the shorter ones. Each branchia contains a simple vascular loop without anastomoses.

From the eighteenth segment onwards there are on the sides of the body, lower down than the branchiæ, and at the boundary between each two segments, some tubercles, which posteriorly become racemose. These are egg-racemes or external ovaries (figs. 6 & 7), with ova not yet fully developed (fig. 14). On the inner surface of the body-wall there are elongated ova (fig. 13) in the same segments of the body which bear external ovaries.

Unfortunately only one example of this worm was found. It is brownish yellow (in spirit), and has on the middle of the hinder part of the back two brown longitudinal lines, which are thickened parts of the cuticle.

I place this new genus among the *Spioidei*. It has no cephalic appendages like *Prionospio*, Malmgr., possesses linguliform branchiæ with a simple vascular loop, like *Spio*, Fab., and has a comb-like series of thick setæ in the fifth body-segment, like *Polydora*, Busk (*Leucodore*, Johnst.).

The formation of the ova in external ovaries is a phenomenon not previously observed among the Annelides.

6. *Scoloplos armiger*, Müll.

Sabine Island.

Distr. Spitzbergen to the Baltic, north of France.

7. *Travisia Forbesii*, Jolnst. Length 40 millims., thickness 6 millims. in the middle.
Sabine Island.
Distr. West Greenland, Spitzbergen to the Western Baltic, Scotland.
8. *Scolibregma inflatum*, Rathke. Length 50 millims.
Distr. Cattegat to Spitzbergen, Scotland, West Greenland; 5–280 fathoms.
9. *Thelepus circinatus*, Fab.
Sabine Island, 20 fathoms.
Distr. Mediterranean, Britain, Cattegat to Finmark, Iceland, Spitzbergen, West Greenland.
10. *Protula media*, Stimps.
Sabine Island, 20 fathoms. (Prof. Möbius gives a description and figures of this species.)
Distr. Grand Manan (45° N. lat.).
11. *Serpula spirorbis*, Müll. Diameter 3 millims.
Shannon Island.
Distr. West Greenland, North Sea, Baltic.
12. *Chione infundibuliformis*, Kröy.
Sabine Island, 2½ fathoms.
Distr. Finmark, Spitzbergen, West Greenland; 15–40 fathoms.

GEPHYREA.

Priapulus caudatus, Lamk.

TURBELLARIA.

Polystemma roseum, Müll. Length 50–53, breadth 8, height 4 millims. (in spirit).
Clavering Straits, 15 fathoms.
Distr. Norway, the Sound, Western Baltic.

NEMATODES.

Ascaris mystax, Rud. (From the intestine of *Canis lagopus*.)

CESTODES.

1. *Tetrabothrium anthocephalum*, Rud. (From the intestine of *Cystophora cristata*.)
2. *Tenia expansa*, Rud. (From the intestine of *Ovibos moschatus*.)
3. *Tenia cœnurus*, Küch. (From the intestine of *Canis lagopus*; described.)

ECHINODERMATA.

HOLOTHURIOIDEA.

- Myriotrochus Rinkii*, Steenstr. Length 45, thickness 8 millims.
 Germania Harbour, 2 fathoms.
Distr. West Greenland, down to 10 fathoms.

ECHINOIDEA.

- Echinus dröbachiensis*, Müll.
 Clavering Island, 15 fathoms.
Distr. Circumpolar; Newfoundland, Bay of Georgia,
 White Sea, Kamtschatka, Sea of Ochotsk, North Cape to
 the Sound, Britain.

ASTEROIDEA.

1. *Asteracanthion albulus*, Stimps.
 Sabine Island.
Distr. West Greenland, Grand Manan.
2. *Ophioglypha robusta*, Ayres. 27 fathoms.
Distr. West Greenland, Massachusetts, Iceland, Spitz-
 bergen, Norway to the Sound, Britain.
3. *Ophiecten sericeum*, Forbes. 26 fathoms.
Distr. East Greenland, West Greenland, Spitzbergen.
4. *Asterophyton eucnemis*, Müll. & Tr.
Distr. West Greenland, down to 1000 fathoms.

CŒLEENTERATA.

1. *Actinia nodosa*, Fab.
2. *Briareum grandiflorum*, Sars.
Distr. Öxfjord in Finmark, Arendal.

EXPLANATION OF PLATE XI. figs. 4-14.

Leipoceras uviferum.

- Fig.* 4. Head and fore body from above ($\frac{12}{1}$).
Fig. 5. Head from below ($\frac{12}{1}$).
Fig. 6. Nineteenth and twentieth segments, right side, with the com-
 mencement of the external ovaries.
Fig. 7. Forty-second and forty-third segments, with the external ovaries
 further developed.
Fig. 8. Uncini of the fifteenth segment, from below ($\frac{40}{1}$).
Fig. 9. Seta of an upper tuft in the fore body.
Fig. 10. Seta of a lower tuft in the fore body.
Fig. 11. Thick setæ of the fifth segment.
Fig. 12. Inferior fine setæ of the fifth segment.
Fig. 13. Ovum from the body-cavity of the hinder body ($\frac{275}{1}$).
Fig. 14. Ovum from an external ovary ($\frac{275}{1}$).

XXX.—On the Invertebrate Marine Fauna and Fishes of St. Andrews. By W. C. M'INTOSH.

[Continued from p. 145.]

Subkingdom CŒLEENTERATA.

Class HYDROZOA.

The Hydroid Zoophytes of St. Andrews are chiefly procured from the deep water of the bay, though a few appear between tide-marks. Many are found in great profusion. Contrasted with the southern shores, as at Devon and Cornwall*, the majority of the Hydroids are equally common in both localities; some occur more frequently in the one than in the other, while a third series is more characteristic of each area. Thus *Sertularella rugosa*, *Sertularia cupressina*, *Thuiaria thuja*, and *Halecium muricatum* appear to be more abundant at St. Andrews than in the south; on the other hand, *Sertularia argentea* and *Obelia dichotoma* are probably more plentiful in the latter, together with the appearance of *Tubularia* at the extreme margin of low water. The characteristic forms in the south are *Corymorpha nutans*, *Aglao-phenia pluma*, *A. pennatula*, *Ophiodes mirabilis*, *Diphasia pinnata*, and an abundance of the species of *Plumularia*. At St. Andrews *Sertularia filicula*, *S. fusca*, *Tubularia coronata*, *Cuspidella humilis*, and *Halecium labrosum* afford distinguishing features. Moreover, instead of the tufted *Clava squamata*, so common on the littoral Fuci of the western coast, we have *C. multicornis* at St. Andrews on the under surface of stones; the splendid *Corymorpha nutans* of the sandy voes, and the rich tufts of littoral Corynidae and Gonothyræ of the Zetlandic region, are likewise wholly absent. Amongst the Hydromedusæ, *Sarsia prolifera*, Forbes, occurs occasionally, and *Thaumantias pilosella*, Forbes, in great abundance on the surface of the bay in autumn.

The habit of the zoophytes affords many interesting facts, especially in regard to the profusion of parasitic structures. The roots of the polyparies spring from diverse shells, stones, crabs, submerged sticks and branches. One of the most curious examples found by the fishermen in the bay consisted of a stout branch of a thorn-tree, about four feet in height, which had large specimens of *Balanus Hameri* and Ascidians clustered like living fruit on the main trunk and branches,

* J. & R. Q. Couch, in their 'Cornish Fauna;' the elaborate catalogue of the Rev. T. Hincks in the 'Ann. & Mag. Nat. Hist.' 1861-62; and Mr. Parfitt's Devonshire Catalogue published in 1866.